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㉓ **Financial transaction processing system using integrated circuit card.**

㉔ A financial transaction processing system comprising an IC card (6) for use in transaction with a financial body, terminals (21e-24e) communicating with the IC card (6) and centers (21-24) provided for each financial body. The IC card (6) comprises a read only memory (2) for storing data for specifying transaction accounts corresponding to a plurality of financial bodies and data of a single secret number common to the financial bodies. When the IC card (6) is inserted into the terminal, a customer can designate a specific account which he wishes to use, by operating a keyboard (20) provided in each of the terminals. In response to such designation, the corresponding account specifying data is read out from the ROM, but if the corresponding account is not stored in the ROM 2, a transaction can not be made. In addition, the account specifying data as read out and a claimed amount entered by a customer are sent to a center of each of the financial bodies where processing for payment is performed. However, if and when the balance is not sufficient, the center instructs the customer to select other account. A random access memory (3) included in the IC card (6) is made to store the amount after payment processing in the center, so that a transaction can be made with a cash dispensing terminal in an offline manner, by using such IC card (6).

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Financial Transaction Processing System  
Using Integrated Circuit Card

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a financial transaction processing system using an integrated circuit (IC) card. More particularly, the present invention relates to a financial transaction processing system comprising an integrated circuit having a storage area for storing data specifying a plurality of transaction accounts corresponding to a plurality of financial bodies, such as a bank and a credit company, and a terminal for selecting from such a plurality of transaction accounts a specific account which a customer wishes to select so that a transaction can be performed.

Description of the Prior Art

Presently, a magnetic card such as so-called cash card and credit card has been widely used for payment, deposit, transfer and the like through an online system in the financial bodies such as a bank and a credit company. Data for identifying a customer, such as a secret number, is magnetically stored in the magnetic card. When a transaction is performed, a customer goes to a bank at which he has a bank account, with such magnetic card,

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where he inserts his card into a terminal such as an automatic teller machine (ATM) and a cash dispenser (CD) installed therein and enters into the terminal the data necessary for transactions, such as a secret number, and a  
5 kind of transaction and a transaction amount by operating inputting means, such as a keyboard, in accordance with predetermined procedures. The information of secret number read out by the terminal and the information of each of transactions entered into the terminal by a  
10 customer are transmitted to a center of the bank, and in response to these informations, a center file is renewed and then an instruction indicating that the transaction is performed is provided to the terminal. Thus, any transaction is performed between the customer and the  
15 terminal.

In addition, according to a recent online system, a communication can be made possible among different banks, in which system it is possible for a customer to make payment from his bank account by using a terminal of  
20 another bank at which he has no bank account. For example, if and when a card of "A" bank at which a customer has a bank account is used with respect to a terminal of "B" bank at which he has no bank account, the transaction data read out, in the "B" bank, from the card  
25 of "A" bank is transmitted to a center of the "B" bank,

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from which the data is again transferred to the center of  
"A" bank. Then, in the center of the "A" bank, it is  
determined whether there is his bank account or not and  
then, if there is his bank account at the "A" bank, the  
5 corresponding file is renewed in accordance with  
transaction information. In addition, an instruction  
indicating permission of transaction is transmitted to the  
terminal of the "B" bank wherein a desired transaction can  
be achieved between the card owner and the terminal of the  
10 "B" bank.

Furthermore, according to the conventional online  
system, a present balance in an account, that is, an upper  
limit of payable amount is recorded in the card, so that a  
cash can be dispensed within the upper limit of payable  
15 amount recorded in the card through an offline transaction  
of a terminal during a time period other than the online  
system operating time period.

Meanwhile, in a recent social circumstances where  
cards such as a cash card and a credit card are  
20 increasingly used, a person usually must own several kinds  
of cards and select from these cards a necessary card for  
use. It is expected that such tendency will progressively  
increase. However, if each individual comes to own a  
plurality of cards, that is, a plurality of financial  
25 transaction accounts, a secret number must be set for each

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card and hence there might be fear that a card is erroneously selected and/or a secret number is erroneously entered, which means that such situation makes handling and storage of the cards complicated.

5        In order to avoid such situation, it is desirable that data of transaction accounts corresponding to all of the financial bodies which each individual has business relations with, and a single secret number common to all of the financial bodies can be stored in a single card so  
10       that only one account that a customer is going to transact business with can be selected from these accounts.

      In addition, if and when a customer designates an erroneous account number which is not included in the stored account numbers, the customer can not know why the  
15       transaction is not interrupted or inhibited unless the terminal provides any response and hence the customer will be at a loss. Therefore, in such a situation, it is desirable that a terminal can show the customer that the transaction is impossible. Furthermore, if and when lack  
20       of the balance in a selected account occurs, it is desirable to give a customer a further chance to select another account number, without immediately interrupting or stopping the transaction.

      In addition, in order to eliminate risks that a  
25       customer owns cashes, it is desired that a system can be

realized wherein a cash dispensing is made all the time  
(including holidays such as Saturday and Sunday) through  
an offline transaction in a terminal, when an online  
system operating time period has passed. Therefore, it is  
5 desirable that a payable balance in the account can be  
recorded in the card in which the data of the above  
described transaction accounts are stored.

However, a conventional magnetic card has a  
limitation with respect to storage capacity, that is,  
10 there is a problem that only information concerning a  
single financial body can be stored in a single card.  
Furthermore, it is assumed that for payment in an offline  
manner, a payable balance was recorded in a card during an  
operating time period of an online system, in which case  
15 if and when the payment is made in an offline transaction  
manner after an online system operating time period has  
passed, the processing in the center necessary for such  
payment will not be made by the time of the next day at  
the earliest. Therefore, there is also a problem that  
20 there exists some risks that there is a time period when a  
difference between a actual balance and a nominal balance  
in the center occurs, which is a cause of unfair use.

#### SUMMARY OF THE INVENTION

Briefly stated, the present invention is directed to  
25 a financial transaction processing system comprising an

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integrated circuit card for use in financial transaction processing and a terminal communicating with the integrated circuit card, the integrated circuit card including first data storage means having a storage area  
5 for storing data specifying transaction accounts corresponding to a plurality of financial bodies, and the terminal including account designating means for designating a specific account which a customer wishes to use, out of the plurality of transaction accounts  
10 corresponding to the plurality of financial bodies. The integrated circuit card further includes transaction data outputting means responsive to said account designating means for reading out data specifying the account designated by said account designating means from the data  
15 specifying transaction accounts corresponding to said plurality of financial bodies stored in the storage area and for transmitting the read data to the terminal.

In accordance with another aspect of the present invention, the financial transaction processing system  
20 further comprises a center apparatus provided for each of the plurality of financial bodies, wherein said terminal further includes claimed amount information entering means for entering information concerning a first claimed amount, transaction data transmitting means for  
25 transmitting the first claimed amount information and the

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designated account specifying data to the center apparatus  
which the designated account belongs to. The center  
apparatus includes a center file for storing information  
associated with related accounts, including balance  
5 information of the related accounts, and account balance  
collating means for determining whether the first claimed  
amount is less than the balance of the designated account  
stored in the center file and for transmitting a signal  
indicating lack of balance when the first claimed amount  
10 is more than the balance. The terminal further includes  
instructing means responsive to said  
lack-of-balance-indicating signal for instructing a  
customer to designate a new account from said plurality of  
transaction accounts expect for the designated account,  
15 using the account designating means.

In accordance with a further aspect of the present  
invention, the financial transaction processing system  
further comprises a center apparatus provided for each of  
the plurality of financial bodies, wherein the integrated  
20 circuit card further includes second data storage means  
having a writable and readable storage area at least for  
amount information, and the terminal further includes  
claimed amount information entering means for entering  
first claimed amount information, transaction data  
25 transmitting means for transmitting the first claimed



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amount information and the data specifying the designated account to the center apparatus which the designated account belongs to, and writing means for writing the first claimed amount information and the designated  
5 account specifying data into the storage area of the second storage means. The central apparatus further includes a center file for storing information associated with the related accounts, including balance information of the accounts included in the file and payment  
10 processing means responsive to the first claimed amount information received from the transaction data transmitting means and the designated account specifying data for making a payment processing based on the balance of the designated account stored in the center file.

15 In accordance with a further aspect of the present invention, a financial transaction processing system further comprises a cash dispensing terminal for communicating with the integrated circuit card having the storage area of the second data storage means in which the  
20 first claimed amount information and the designated account specifying data are stored in the second data storage means, the cash dispensing terminal including entering means for entering a second claimed amount. The integrated circuit card further includes means for  
25 comparing the second claimed amount as entered with the

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first claimed amount information stored in the storage area of the second data storage means for providing a payment instruction instructing the cash dispensing terminal to dispense the cash corresponding to the second  
5 claimed amount when the second claimed amount is less than the first claimed amount.

In accordance with a still further aspect of the present invention, the integrated circuit card further includes impossible transaction indicating signal  
10 outputting means for generating a signal indicating an impossible transaction to the terminal when the account designated by the account designating means is not included in the transaction accounts for the plurality of financial bodies stored in the storage area. In  
15 accordance with a still further aspect of the present invention, the account designating means designates, from the plurality of transaction account corresponding to the plurality of financial bodies, the specific account of specific financial body which the terminal belongs to.

20 In accordance with a still further aspect of the present invention, the account designating means further includes means for selecting and designating a desired account from the plurality of financial body's transaction accounts.

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In accordance with other aspect of the present invention, the first data storage means in the integrated circuit card further includes a storage area for storing a single secret number information common to the plurality  
5 of financial bodies.

Accordingly, a primary object of the present invention is to provide a financial transaction processing system capable of performing a transaction with a desired transaction account using only a single integrated  
10 circuit, even if the customer has a plurality of transaction accounts at a plurality of financial bodies, whereby complexity in handling and managing a plurality of cards can be eliminated.

Another object of the present invention is to provide  
15 a financial transaction processing system in which a cash dispensing from a terminal is made possible in an offline manner as necessary, even if an operating time period of an online system has passed.

A primary advantage of the present invention is that  
20 a single integrated circuit can store data concerning a plurality of transaction accounts corresponding to a plurality of transaction financial bodies at which a customer has the transaction accounts and when a transaction is done, a customer directly goes to a bank at  
25 which he has a bank account, or he selects a specific

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account which he wishes to use, from the plurality of transaction accounts data stored in the integrated circuit card through a terminal, so that a necessary transaction can be performed.

5        Another advantage of the present invention is that if and when lack of the balance in the selected account occurs, a customer is informed of such lack of the balance so that the customer can again select another account, and hence the transaction need not be repeated from the start,  
10        thereby to improve efficiency of operating the terminal.

      A further advantage of the present invention is that since cash dispensing from a terminal in an offline manner is made possible, a risk of person having a cash with him is reduced and, in addition, since payment processing in a  
15        center is completed when a claimed amount is entered in an integrated circuit, unfair use which might be caused due to delay of payment processing in the center can be prevented.

      A further advantage of the present invention is that  
20        a customer can retry to designate a correct account without any trouble, even if an erroneous account which is not stored in the integrated circuit card is designated, since the terminal can indicate an impossible transaction to the customer.

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A further advantage of the present invention is that since a secret number is common with respect to all of the transaction accounts, a customer can simply learn only one secret number by heart, so that complexity in handling  
5 card can be eliminated.

These objects and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the  
10 accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram showing an electric structure of an integrated circuit of one embodiment of the present invention;

15 Fig. 2 is a plan view of an integrated circuit card of one embodiment of the present invention;

Fig. 3 is a memory map of a read only memory contained in an integrated circuit of one embodiment of the present invention;

20 Fig. 4 is a memory map of a random access memory contained in an integrated circuit card of one embodiment of the present invention;

Fig. 5 is a schematic block diagram showing an electric structure of a terminal for use in an integrated  
25 circuit of one embodiment of the present invention;

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Fig. 6 is a perspective view of a terminal for use in an integrated circuit of one embodiment of the present invention;

Fig. 7 is a diagram showing a connection between  
5 centers in an integrated circuit card system of one embodiment of the present invention;

Figs. 8A and 8B are flow diagrams for explaining an operation of a financial transaction processing system of one embodiment of the present invention;

10 Figs. 9A and 9B are flow diagrams explaining an operation of a financial transaction processing system of another embodiment of the present invention;

Figs. 10A and 10B are flow diagrams explaining an operation of financial transaction processing system of  
15 another embodiment of the present invention;

Fig. 11 is a flow diagram explaining an operation of a financial transaction processing system of another embodiment of the present invention; and

20 Fig. 12 is a flow diagram explaining an operation of a financial transaction processing system of another embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 is a schematic block diagram showing an electric structure of an integrated circuit card

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constituting a financial transaction processing system of one embodiment of the present invention.

An integrated circuit card is of the same size and configuration as a conventional magnetic card such as a cash card and a credit card and contains therein at least  
5 a memory, such as a read only memory and a random access memory, a central processing unit (CPU) and a plurality of contacts (usually eight contacts) connecting to a terminal. A conventional magnetic card has a small  
10 storage capacity and the information stored in the magnetic card can be easily decoded. As compared with such conventional magnetic card, the feature of the IC card resides in the point that the IC card has a large amount of storage capacity and the programming is made in  
15 such a manner that it can not be easily read out so that the information stored therein can be prevented from being decoded by others, whereby a security is enhanced. In addition, the IC card itself can provide a request to a terminal.

20 Referring to Fig. 1, the IC card is provided with contacts 5a to 5h for connecting to a terminal. Of these contacts, the contact 5b is used for communicating between the IC card and the terminal. The contacts 5d and 5h are used for supplying a power supply (0V, + 5V) from the  
25 terminal to the central processing unit 1 of the IC card.

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The contact 5f is used for supplying clock signals to the central processing unit 1 and the contact 5g is used for supplying a reset signal to the CPU1. The contact 5c is used for supplying a power for altering the storage contents in the ROM only when the storage contents in the ROM is altered. The remaining contacts 5a and 5e are extra contacts. In addition, the CPU1, ROM2 and RAM3 are interconnected through a data bus 4. The CPU controls operation of each constituent elements.

10        Fig. 2 is a plan view of an integrated circuit card constituting one embodiment of the present invention. Referring to Fig. 2, a front panel of an integrated circuit card body 6 has a group of contacts 5 (which is comprised of contacts 5a through 5h shown in Fig. 1),  
15        which are connected to an integrated circuit card reader provided in a terminal, when the IC card 6 is inserted to the terminal. In addition, the IC card 6 has also an embossed display 7 displaying a name of card owner, etc.

         Fig. 3 is a drawing showing a memory map of an  
20        integrated circuit card constituting an embodiment of the present invention, which includes data specifying transaction accounts corresponding to a plurality of banks at which the card owner has bank accounts, stored in a storage area of the ROM 2 of the IC card. Referring to  
25        Fig. 3, there exist the first, the second, ... the n-th



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account flags and head addresses of transaction account data corresponding to these account flags, respectively, and the like are stored for each account flag. There is a single secret number common to all of the accounts,  
5 followed by detailed transaction data for the first to the n-th accounts.

Fig. 4 is a diagram showing a memory map of a random access memory of an integrated circuit card constituting one embodiment of the present invention, which includes  
10 areas for deposit in which a limited payable amount for each account is stored for the purpose of payment in an offline manner. Referring to Fig. 4, amount of payment can be stored in each area for deposit, such as first area, second area, ... n-th area.

15 Fig. 5 is a schematic block diagram showing an electric structure of a terminal communicating with an integrated circuit card constituting an embodiment of the present invention shown in Figs. 1 to 4. Referring to Fig. 5, an integrated circuit card reader 9 is a unit for  
20 communicating with the CPU 1 of the inserted IC card through the contact 5. A CRT 10 is a unit for indicating procedures for transaction to a customer and for making a customer select a desired transaction account. A keyboard  
25 11 is a unit used for entering a desired account and a secret number so that a customer can communicate with the

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terminal. A slip issuing machine 12 is a unit for issuing a slip in response to permission of payment from a center. A paper discharging machine 13 is a unit for discharging a paper to a customer. Each of these units is connected to a main control 8 through internal data buses and the main control 8 controls operation of these units. The main control 8 is connected to a central processing unit (not shown) of a center of each banks through a line control 14 and an input/output terminal 15.

Fig. 6 is a perspective view of a terminal for an integrated circuit card constituting one embodiment of the present invention. Referring to Fig. 6, a main body 16 of a terminal for use with an integrated circuit card is provided with an IC card inserting opening 17 and a slip/paper discharging opening 18 in a vertical surface thereof and a CRT 19 and a keyboard 20 in a horizontal surface, that is, an operating panel. The IC card inserting opening 17 is for insertion of the IC card when a customer is to perform a transaction, the slip/paper discharging opening 18 is used for presenting to a customer papers and slip upon payment, which is opened only when payment is made. The CRT 19 is used for providing a customer with operational procedure and the keyboard 20 is used for entering a number corresponding to

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a desired transaction account, a secret number and a claimed amount.

Fig. 7 is a schematic block diagram explaining connection between centers in a financial transaction processing system of one embodiment of the present invention. Referring to Fig. 7, the reference numerals 21, 22, 23 and 24 denote centers of banks, respectively, comprising line controls for terminal 21a, 22a, 23a and 24a, line controls among the centers 21b, 22b, 23b and 24b, central processing units 21c, 22c, 23c and 24c, and individual information files 21d, 22d, 23d and 24d, respectively. Each of the centers is connected to a plurality of terminals. For example, the center 21 is connected to a plurality of terminals including a terminal 21e, line connection between each of the terminals and the center 21 is controlled by the line control 21a for a plurality of terminals. The transaction data received from the terminal 21e and the like is provided to the center CPU 21c, which in turn retrieves and renews the individual information file 21d and makes a transaction processing if and when the received transaction data is related to the data concerning transaction with the corresponding bank. If and when the received transaction data is related to the data concerning transaction with other bank, the transaction data is transferred to other

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bank by using the line control 21b and communication lines 25, 26 or 28. The center CPU of other bank receiving such transferred transaction data retrieves individual file based on the received data and renew the same and then can  
5 make a transaction processing.

Figs. 8A and 8B are flow diagrams explaining an example of a specific transaction processing of the financial transaction processing system of one embodiment of the present invention.

10 Referring to Figs. 1 to 8B, a specific operation of one embodiment of the present invention will be described.

First, a customer directly goes to a bank where he wishes to make a transaction processing with an IC card as shown in Figs. 1 to 3. Then, the customer inserts his IC  
15 card into a terminal installed in the bank (Step S1). Then, an electric power is supplied to the CPU 1, ROM 2 and RAM 3 of the IC card, through the contacts 5d and 5h, from the terminal (Step S2). Then, the terminal generates a start-of-message (SOM) and send it to the CPU 1 of the  
20 IC card through the contact 5b (Step S3). The start-of-message comprises an inherent identification (ID) mark representative of a bank which the terminal belongs to and a bank number. The IC card, which received such start-of-message (Step S18), sequentially collates the ID  
25 mark and the bank number included in the received

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start-of-message with ID marks and bank numbers of the first to the n-th transaction accounts which are stored in the storage areas of the ROM 2 shown in Fig. 3 (Steps S19, S20 and S21). As a result, if and when it is determined  
5 that the account specified by the ID mark and the bank number corresponding to the ID mark and the bank number included in the received start-of-message does not exist in the detailed data specifying a plurality of financial body's accounts stored in the ROM 2 of the IC card (Step  
10 S21), the CPU 1 generates a signal indicative of an impossible transaction in accordance with the program stored in the ROM 2 and transmit the signal to the IC card reader 9 of the terminal (Step S22). If and when it is determined that the corresponding account specified by the  
15 ID mark and the bank number included in the received start-of-message exists in a plurality of accounts stored in the ROM 2 (Step S21), the CPU 1 reads out all of the data of this account, such as account number, effective time period and the like and transmits the data to the  
20 terminal (Step S23).

In such a way, the terminal receiving a message indicating an impossible transaction or a message including a corresponding account data transmitted from the IC card (Step S4) indicates to a customer that the  
25 transaction required by him, is impossible by returning

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his IC card to him if and when the received message indicates an impossible transaction (Step S5), and stores the received account data (Step S6) if and when the received message includes the detailed data of a  
5 corresponding account.

In the terminal, the main control 8 generates a message requesting a secret number and transmits the message to the CPU 1 of the IC card (Step S7). The IC card receiving such transmitted message determines whether  
10 the received message requests a secret number (Step S24) and if so, the IC card reads out a secret number common to all of the accounts shown in the memory map in Fig. 3 and transmits the secret number to the IC card reader of the terminal (Step S25). When the terminal receives such  
15 secret number, the main control 8 determines whether the received message is a secret number or not (Step S8) and if the received message is a secret number, the main control 8 generates an end mark indicating that all of communication is terminated and transmits the end mark to  
20 the CPU 1 of the IC card (Step S9). In the IC card receiving such end mark, it is determined whether the received message is an end mark or not (Step S26) and if so, all of communication is terminated.

The subsequent operation on the terminal side is the  
25 same as in a usual cash card. First, a secret number is

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entered to a terminal by a customer using a keyboard 20  
(Step S10) and the main control 8 determines whether the  
entered secret number coincides with the received secret  
number from the above described IC card (Step S11). If  
5 and when the entered secret number does not coincide with  
the received secret number from the IC card, the IC card  
is returned to a customer and the transaction is made  
impossible. If and when both secret numbers coincide with  
each other, an amount as claimed for payment is entered  
10 into the terminal by a customer using the keyboard 20  
(Step S12). The detailed data of the corresponding  
account read out from the IC card, which is now stored in  
the terminal, and the claimed amount as entered are  
transmitted to a center of a bank which the terminal  
15 belongs to (Step S13), in which a center file is retrieved  
and renewed in accordance with the transmitted data and an  
instruction indicating permission of payment is provided  
to the terminal (Step S14). The terminal receiving such  
instruction directs the slip issuing machine 12 to issue a  
20 payment slip (Step S15) and directs the paper discharging  
machine 13 to dispense the cash to a customer (Step S16).  
After completion of payment to a customer, the IC card is  
returned to a customer and the transaction is terminated.

Figs. 9A and 9B are flow diagrams explaining a  
25 specific operation of a financial transaction processing

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system in which a desired account is selected from a plurality of accounts stored in an integrated circuit card, by using a terminal so that a transaction is made.

Now, referring to Figs. 1 to Fig. 9B, an operation of  
5 a financial transaction processing system of one embodiment of the present invention will be described.

First, a customer goes to a bank with an integrated circuit card shown in Figs. 1 to 3. Since selection of an account can be made by operation of a terminal, the bank  
10 is not necessarily a bank that he directly makes a transaction with. The customer inserts his IC card into a terminal installed in the bank (Step S27). Then, an electric power is supplied to the CPU 1, ROM 2 and RAM 3 included in the IC card shown in Fig. 1 (Step S28). In  
15 the terminal, the main control 8 make the CRT 19 display that number of amount is to be selected and entered so that a customer is informed to the effect (Step S29). Meanwhile, the "number of account" refers to the number of 1 to n labeled for each of a plurality of accounts stored  
20 in the storage areas of the ROM 2 of the IC card, as shown in a memory map of Fig. 3 and it is assumed that the customer knows the name of bank of the account corresponding to the number.

Then, the customer enters into the terminal the  
25 number corresponding to the bank account which he wishes,



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in accordance with the indication by the CRT 19, using the keyboard 20 (Step S30). The number of the account as entered, which is any of the numbers of 1 to n, is stored in the terminal (Step S31) and then is transferred to the CPU 1 of the IC card through the contact 5b, together with a start mark as a start-of-message (Step S32). In the IC card receiving such message, it is determined whether the received message is a start-of-message or not (Step S46) and if it is a start-of-message, the number of the designated bank account is stored in the RAM 3 (Step S47). Then, the CPU 1 determines whether an account flag in the ROM 2, corresponding to the number of the account is set or not (Step S48) and if it is not set, the CPU 1 generates a signal indicating an impossible transaction in accordance with the program stored in the ROM 2 and transmit the signal to the IC card reader 9 of the terminal (Step S49). If and when it is determined that the corresponding account flag is set, the CPU 1 reads out all of the detailed account content data, such as account number and effective time period and transmits the data to the IC card reader 9 of the terminal (Step S50). The terminal receiving an impossible transaction indicating message or an account content message (Step S33), shows a customer that the transaction required by him is impossible by returning the IC card to him if the message

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transmitted from the IC card indicates an impossible transaction (Step S34), and the terminal stores the data of account contents if and when the message transmitted from the IC card is the detailed data of the account content (Step S35).

In the terminal, the main control 8 generates a message requesting a secret number and transmits the message to the CPU 1 of the IC card (Step S36). In the IC card receiving such message, it is determined whether the received message requests a secret number or not (Step S51) and if it requests a secret number, a secret number common to all of the accounts shown in the memory map of Fig. 3 is read out and transmitted to the IC card reader 9 of the terminal (Step S52). In the terminal, it is determined whether the received message is a secret number or not (Step S37), and if it is a secret number, an end mark indicating that all of communication is to be terminated and transmitted to the CPU 1 of the IC card (Step S38). In the IC card receiving the end mark, it is determined whether the received message is an end mark or not (Step S53) and if it is an end mark, all of communication is terminated.

All of the subsequent operation on the terminal side is substantially the same as the operation in the terminal in the embodiment shown in Fig. 8. However, determination

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of coincidence between the key-inputted (Step S39) secret number and the secret number received from the IC card is not made in the terminal and the secret number is transmitted to the center together with a payment-claimed amount and the like (Step S41) and then in the center, coincidence of the secret number is made.

As described in the foregoing, according to this embodiment, an integrated circuit card in which the data specifying a plurality of transaction accounts corresponding to a plurality of financial bodies can be used and in making a transaction, a customer directly goes to a bank or operates a terminal to select a desired financial body so that a desired transaction can be made. Accordingly, a customer simply owns a single integrated circuit card so that complexity of handling and storing a card can be reduced.

Figs. 10A and 10B are flow diagrams explaining an operation of a financial transaction processing system of other embodiment of the present invention. The former operation of this embodiment is exactly the same as the operation shown in Fig. 9A and hence description thereof is omitted. Accordingly, Figs. 10A follows Fig. 9A and hence the additional operation beginning from the step S54 in Fig. 10A will be described. In the terminal, it is determined whether the received message is a secret number

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or not and if it is a secret number, a secret number is entered into the terminal by a customer using a keyboard 20 (Step S54). Thereafter, the customer also enters a claimed amount into the terminal using the keyboard 20  
5 (Step S55). Then, the detailed data of the corresponding account read out from the IC card, which is now stored in the terminal, the claimed amount, and the secret number entered through key-input are transmitted to a center of a bank, for example, the first center, which the  
10 corresponding account belongs to (Step S56) and, in the first center, individual file is retrieved in accordance with these data and it is determined whether the claimed amount is less than the account balance or not (Step S57). As a result, if and when the claimed amount is not over  
15 the account balance, the claimed amount is paid (Step S58) and then the transaction is completed. If and when the claimed amount is over the balance, the terminal indicates lack of account balance to a customer by means of CRT 19 (step S59). Furthermore, the terminal instructs a  
20 customer to select the number of account other than the number of the first account and to key-input the selected number (Step S60) and the number of the account key-inputted by a customer (Step S61) is once stored in the terminal (Step S62) and transmitted to the CPU 1 of  
25 the IC card through the contact 5B, together with a start

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mark as a start-of-message (Step S63). The IC card receiving such message determines whether the received message is a start-of-message or not (Step S73) and if it is a start-of-message, the number of the bank account as designated is stored in the RAM 3 (Step S74). Then, the CPU 1 determines whether the account flag in the ROM 2, corresponding to the number of the account, is set or not (Step S75) and if it is not set, the CPU 1 generates a signal indicating an impossible transaction in accordance with the programs stored in the ROM 2 and transmits the signal to the IC card reader 9 of the terminal (Step S76). If and when the corresponding account flag is determined to be set, the CPU 1 reads out the detailed data of the account content such as the account number and effective time period of this account and transmits the same to the IC card reader 9 of the terminal (Step S77). The terminal receiving such an impossible transaction indicating message or an account content message indicates an impossible transaction to a customer by returning the IC card to him if and when the message transmitted from the IC card indicates an impossible transaction (Step S65), and the terminal stores all of the account contents if and when the message transmitted from the IC card includes detailed data of account contents (Step S66).

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The detailed data of the corresponding account read out from the IC card, which is now recorded in the terminal, and the claimed amount and the secret number as key-inputted are transmitted to a center (the second  
5 center) of a bank which the corresponding account belongs to (Step S67) and, in the second center, an individual information file is retrieved in accordance with such data and it is determined whether the claimed amount is over the account balance. As a result, if and when the claimed  
10 amount is over the account balance, the terminal indicates an impossible transaction to a customer (Step S69) and if and when the claimed amount is not over the account balance, an instruction indicating permission of payment is provided to the terminal. The terminal receiving such  
15 instruction directs the slip issuing machine 12 to issue a payment slip (Step S70) and the paper discharging machine 13 to dispense a cash to a customer (Step S71). Then, the terminal generates an end mark indicating the all of the communication is to be terminated and transmits the end  
20 mark to the CPU issue of the IC card (Step S70). In the IC card receiving the end mark, it is determined whether the received message is an end mark or not (Step S78) and if it is an end mark, all of communication is terminated. After completion of payment to a customer, the IC card is

30

returned to a customer and all of the transaction is completed.

As described in the foregoing, according to this embodiment, if and when lack of balance in the selected  
5 account occurs, another account can be selected from the customer's remaining accounts so that the desired transaction can be performed. Accordingly, a customer needs not to retry a transaction processing from the beginning even in the situation of the lack of balance,  
10 and hence efficiency of operating a terminal can be improved. Fig. 11 is a flow diagram explaining a specific operation for payment processing in a center and for storage of claimed amount information to an integrated circuit card, in a financial transaction processing system  
15 of one embodiment of the present invention.

The former operation of this embodiment is exactly the same as the operation shown in Fig. 9A and hence the description thereof is omitted. Accordingly, Fig. 11 follows Fig. 9A and hence only additional operation  
20 beginning from the step S79 in Fig. 11 will be described.

In the terminal, it is determined whether the received message is a secret number or not and if it is a secret number, the main control 8 directs the CRT 19 to indicate to a customer that a secret number should be  
25 entered by using a keyboard 20. In accordance with this

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instruction, the customer key-inputs his secret number to the terminal (Step S79). Then, the terminal again indicates key-inputting of a claimed amount to a customer and, correspondingly a customer key-inputs desired claimed amount  $\alpha$  (Step S80). Then, the detailed data of the corresponding account read out from the IC card, which is now stored in the terminal, and the secret number and the claimed amount  $\alpha$  as key-inputted are transmitted to a center of a bank which the terminal belongs to and, in addition, such data is transferred to the first center, for example, which the corresponding account belongs to, through a communication line between centers (Step S81). In the center, file is retrieved in accordance with the data and is renewed and then, payment processing is completed. The payment amount, the payment processing of which was already terminated, is again provided to the terminal (Step S83) and such claimed amount is transmitted to the IC card as a claimed amount writing command (Step S84). The claimed amount writing command includes the number designating the corresponding account (for example, first account in this embodiment) and a claimed amount  $\alpha$ . In the IC card receiving such command, the CPU 1 determines whether the received message is such a command (Step S89), and particularly, a claimed amount writing command (Step S90) and, if it is a claimed amount writing



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command, the claimed amount  $\alpha$  is stored in an area M1 for  
claimed amount of the first account in the RAM storage  
area of the IC card in Fig. 4 (Step S91). On the other  
hand, in the terminal, after transmission of the claimed  
5 amount (Step S84), the slip issuing machine 12 is  
instructed to issue a payment slip (Step S85) and  
thereafter, a end command is transferred to the IC card  
(Step S86). In the IC card receiving the ending command,  
it is determined whether the received message is an end  
10 command or not (Step S92), and if it is an end command,  
the communication is terminated and the terminal returns  
the IC card to a customer (Step S87 and Step S88). As  
described in the foregoing, payment processing in the  
center and storage processing of claimed amount to the IC  
15 card are completed. As a result, the limited amount to be  
claimed after payment processing in the center is stored  
in the IC card, but the cash is not actually paid to the  
customer.

Fig. 12 is a flow diagram explaining a specific  
20 operation for making an actual payment in an offline  
manner of a terminal, by using an integrated circuit in  
which the limit amount  $\alpha$  to be claimed is stored in  
accordance with the processing procedures shown in Fig.  
11.

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Referring to Figs. 1 to 12, a specific operation for payment processing of a financial transaction processing system of one embodiment of the present invention will be described.

5       A customer who completed payment processing in the center and storing processing of the limited amount  $\Delta$  to be claimed to an integrated circuit card in accordance with processing procedures shown in Fig. 11, can make a transaction in an offline manner of a terminal, as  
10       necessary, with the integrated circuit card, even if an operating time period of an online system has passed.

First of all, the customer goes to the location where a terminal is installed, with an integrated circuit in which a limit amount  $\Delta$  to be payment-claimed is stored.  
15       Selection of an account which the customer wishes to use is made by operation of the terminal and hence the terminal is not necessarily a terminal of a bank that the customer wishes to directly make the transaction with. Then, the customer inserts his integrated circuit card  
20       into the terminal. The subsequent operation is performed in accordance with the flow diagram shown in Fig. 9A, followed by the flow diagram shown in Fig. 12. Accordingly, the description of operation of Fig. 9A is omitted and additional new operation beginning from the  
25       step S93 in Fig. 12 will be described.

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First, the main control 8 determines whether the secret number key-inputted by a customer (Step S93) coincides with the secret number received from the integrated circuit card (Step S94). If and when both  
5 secret numbers are not coincident with each other, the IC card is returned to a customer and the subsequent transaction is inhibited or is made impossible and if and when both secret numbers are coincident with each other, the customer should key-input a claimed amount  $\beta$  by using  
10 a keyboard (Step S95). The claimed amount  $\beta$  as key-inputted is transmitted to the IC card as a payment command, together with the number designating the corresponding account (the first account in this example) (Step S96). In the IC card receiving such payment  
15 command, it is determined whether the received message is a payment command or not (Step S103) and if it is a payment command, the claimed amount  $\beta$  is subtracted from the limit amount  $\alpha$  to be claimed, which is stored in an area M1 for deposit in storage areas of RAM of the IC card  
20 shown in Fig. 4 (Step S104). Then, it is determined whether the difference M1 is positive or not by the CPU 1 (Step S105) and if it is positive, the desired amount  $\beta$  claimed is determined to be less than the limit amount  $\alpha$  and thus a response for permission of payment is  
25 generated and transmitted to the terminal (Step S106). If

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and when the difference  $M1$  is negative, it is determined that the claimed amount  $\beta$  is not less than the limit amount  $\alpha$  and thus a response indicating that the payment is not permitted is generated and transmitted to the terminal

5 (Step S107). In the terminal receiving such payment permitting response or a payment not-permitting response, the main control 8 directs the paper discharging machine 13 to count papers corresponding to the claimed amount  $\alpha$  and to dispense the correspond cash to a customer, if

10 and when the message transmitted to the IC card is a payment permitting response (Step S98). If and when the message transmitted from the IC card is a payment not-permitting response, the terminal indicates an impossible transaction to a customer by returning the IC

15 card to him (Step S97).

Subsequently, the terminal generates an end command indicating that all communication is to be terminated and transmits the command to the CPU 1 of the IC card (Step S99). In the IC card receiving the end command, it is

20 determined whether the received message is an end command or not (Step S108) and if it is an end command, all communication is terminated. Then, the terminal directs the slip issuing machine 12 to issue a payment slip (Step S100) and thereafter, the IC card is returned to the

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customer and the offline transaction in the terminal is terminated (Steps S101 and S102).

As described in the foregoing, according to the present embodiment, an integrated circuit card in which  
5 the data specifying a plurality of transaction accounts corresponding to a plurality of financial bodies can be used and in making a transaction processing, a desired amount as claimed can be stored in the IC card by  
designating a desired financial body through an operation  
10 of terminal and at the same time, the payment processing in the center can be made to be completed.

Accordingly, a customer can obtain cash from his account through an offline transaction of a terminal even if an operating time period of online system in a bank has  
15 passed, whereby a person needs not be subjected to owning cash and unfair use caused due to delay of payment processing in the center can be prevented.

Although the present invention has been described and illustrated in detail, it is clearly understood that the  
20 same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

## WHAT IS CLAIMED:

1. A financial transaction processing system comprising:

an integrated circuit card (6) for use in financial transaction processing, said integrated circuit card including first data storage means (2) having storage area for storing data specifying transaction accounts corresponding to a plurality of financial bodies; and

a terminal (16) for communicating with said integrated circuit card, said terminal including account designating means (Step S29) for designating a specific account which a customer wishes to use, out of said plurality of transaction accounts corresponding to the plurality of financial bodies;

said integrated circuit card further including transaction data outputting means (Step S23 and Step S50) responsive to said account designating means for reading out data specifying the account designated by said account designating means from the data specifying transaction accounts corresponding to said plurality of financial bodies stored in said storage area and for transmitting the read data to said terminal.

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2. A financial transaction processing system in accordance with claim 1, which further comprises

a center apparatus (21 - 24) provided for each of said plurality of financial bodies, and wherein

5 said terminal further includes

claimed amount information entering means (11) for entering information concerning a first claimed amount, and

transaction data transmitting means (Step S13  
10 and Step S41) for transmitting said first claimed amount information and said designated account specifying data to the center apparatus which said designated account belongs to,

said center apparatus includes

15 a center file (21d, 22d, 23d and 24d) for storing information associated with related accounts, including balance information of the related accounts, and

account balance collating means (Step S57) for determining whether said first claimed amount is less than  
20 the balance of said designated account stored in said center file and for transmitting a signal indicating lack of balance when the first claimed amount is more than the balance, and

said terminal further includes

(continued)

(continued)

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25           instructing means (Step S59) responsive to said  
lack-of-balance-indicating signal for instructing a  
customer to designate a new account from said plurality of  
transaction accounts except for said designated account,  
using said account designating means.

3. A financial transaction processing system in  
accordance with claim 1, which further comprises

a center apparatus provided for each of said  
plurality of financial bodies, and wherein

5           said integrated circuit card further includes second  
data storage means (3) being writable and readable and  
having a storage area at least for amount information,

said terminal further includes

10           claimed amount information entering means for  
entering first claimed amount information,

transaction data transmitting means (Step S81)  
for transmitting said first claimed amount information and  
data specifying said designated account to a center  
apparatus which said designated account belongs to, and

15           writing means (Step S81) for writing said first  
claimed amount information and said designated account  
specifying data into said storage area of said second  
storage means, and

said center apparatus further includes

(continued)



(continued)

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20                   a center file for storing information associated  
with related accounts, including balance information of  
the accounts included in the file, and

                  payment processing means (Step S82) responsive  
to said first claimed amount information received from  
25   said transaction data transmitting means and said  
designated account specifying data for making payment  
processing based on the balance of said designated account  
stored in said center file.

4. A financial transaction processing system in  
accordance with claim 3, which further comprises

                  a cash dispensing terminal for communicating with  
said integrated circuit card having said storage area of  
5   said second data storage means in which said first claimed  
amount information and said designated account specifying  
data are stored, said cash dispensing terminal including  
entering means (Step S95) for entering a second claimed  
amount, and wherein

10               said integrated circuit card further includes means  
(Step S105) for comparing said second claimed amount as  
entered with said first claimed amount information stored  
in said storage area of said second data storage means for  
providing a payment instruction instructing said cash  
15   dispensing terminal to dispense the cash corresponding to

(continued)

(continued)

5

the second claimed amount when said second claimed amount is less than said first claimed amount.

5. A financial transaction processing system in accordance with claim 1, wherein

said integrated circuit card further includes impossible transaction indicating signal outputting means  
5 (Step S49) for generating a signal indicating an impossible transaction and sending it to said terminal when the account designated by said account designating means is not included in the transaction accounts for said plurality of financial bodies stored in said storage area.

6. A financial transaction processing system in accordance with claim 1, wherein

said account designating means designates, from said plurality of transaction accounts corresponding to said  
5 plurality of financial bodies, the specific account of specific financial bodies which said terminal belongs to.

7. A financial transaction processing system in accordance with claim 1, wherein

said account designating means further includes means  
(11) for selecting and designating a desired account from  
5 said plurality of financial body transaction accounts.

6

8. A financial transaction processing system in  
accordance with claim 1, wherein

said first data storage means further includes a  
storage area for storing a single secret number

5 information common to said plurality of financial bodies.

FIG.1

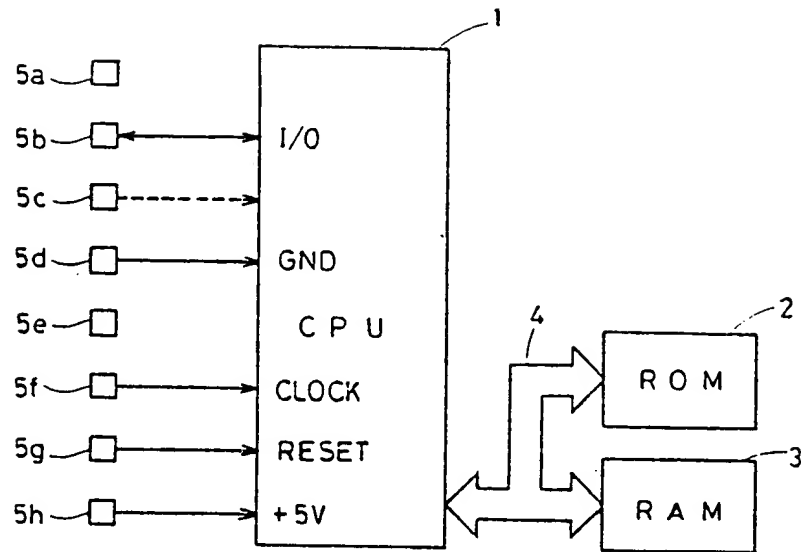


FIG.2

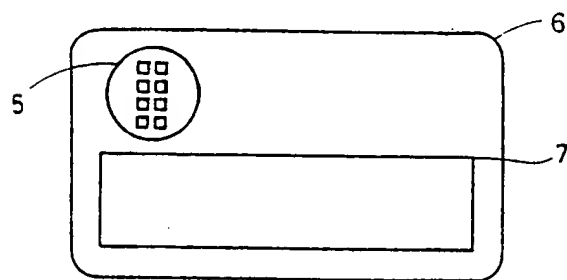


FIG.3

(ACCOUNT FLAG)

1	NAME OF ACCOUNT	HEAD ADDR.	NUMBER OF DIG.
2	"	"	"
3	"	"	"
n	"	"	"
SECRET NO.			
ID MARK			
BANK NO.			
BRANCH NO.			
ACCOUNT NO.			
EFFECTIVE TIME PERIOD			
ID MARK			
BANK NO.			
BRANCH NO.			
ACCOUNT NO.			
EFFECTIVE TIME PERIOD			
ID MARK			
BANK NO.			
BRANCH NO.			
ACCOUNT NO.			
EFFECTIVE TIME PERIOD			

FIRST ACCOUNT

SECOND ACCOUNT

THIRD TO  
(n-1)TH  
ACCOUNTnTH  
ACCOUNT

(ROM.)

FIG.4

AREA M1 FOR DEPOSIT IN FIRST ACCOUNT
AREA M2 FOR DEPOSIT IN SECOND ACCOUNT
AREA M3 FOR DEPOSIT IN THIRD ACCOUNT
AREA Mn FOR DEPOSIT IN nTH ACCOUNT
AREA FOR ACCESSING ACCOUNT NUMBER (RAM)

FIG. 5

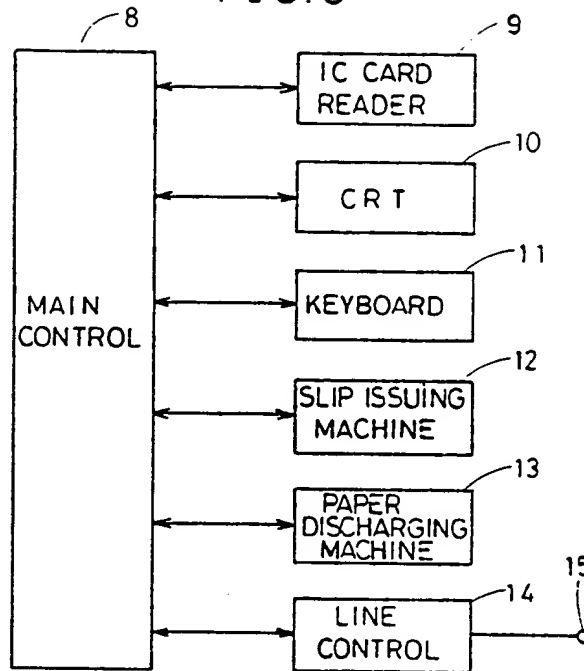


FIG. 6

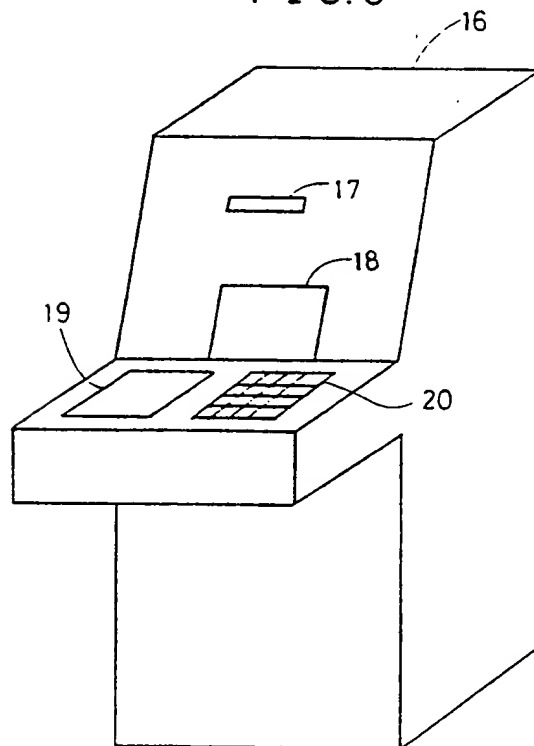


FIG. 7

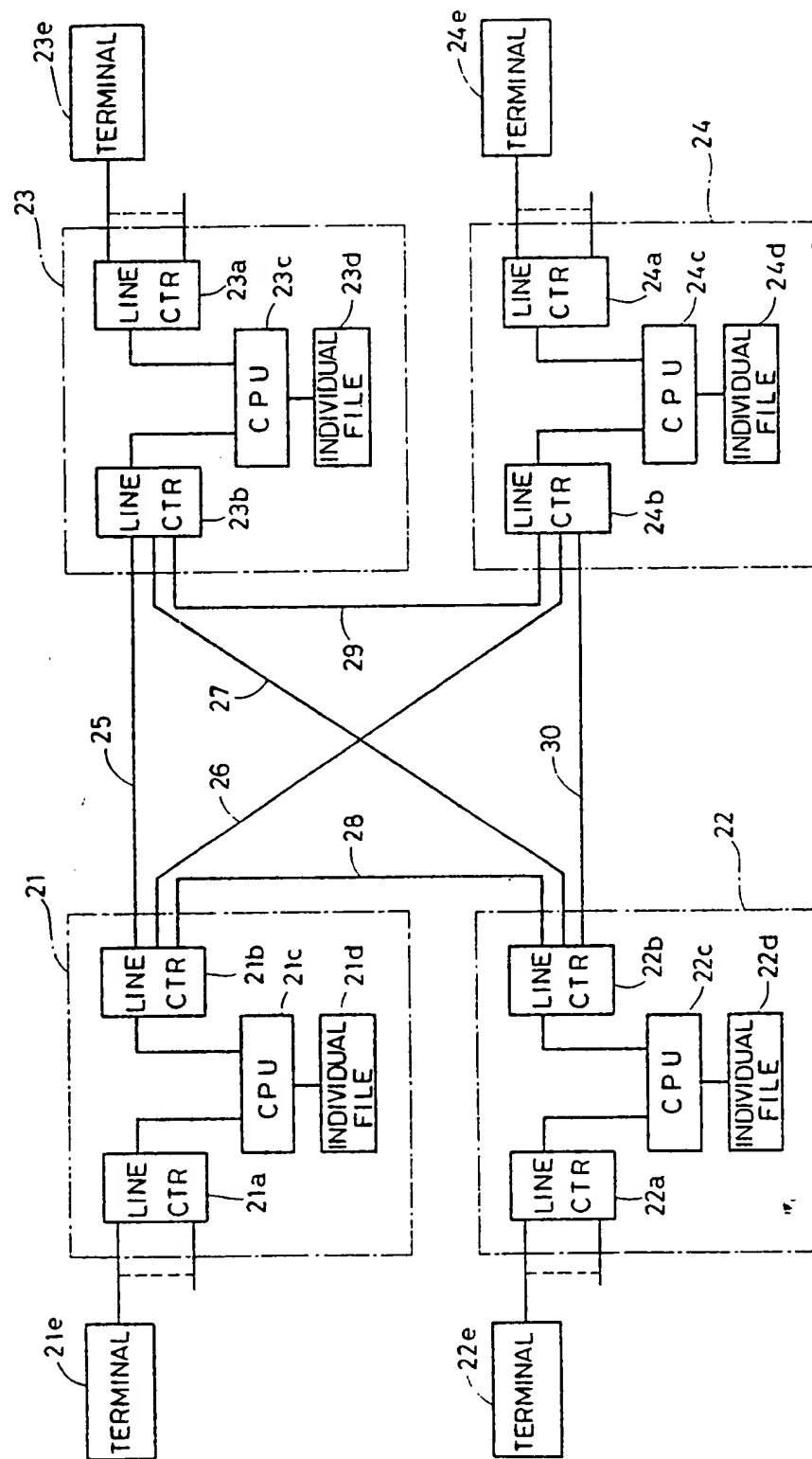


FIG. 8A

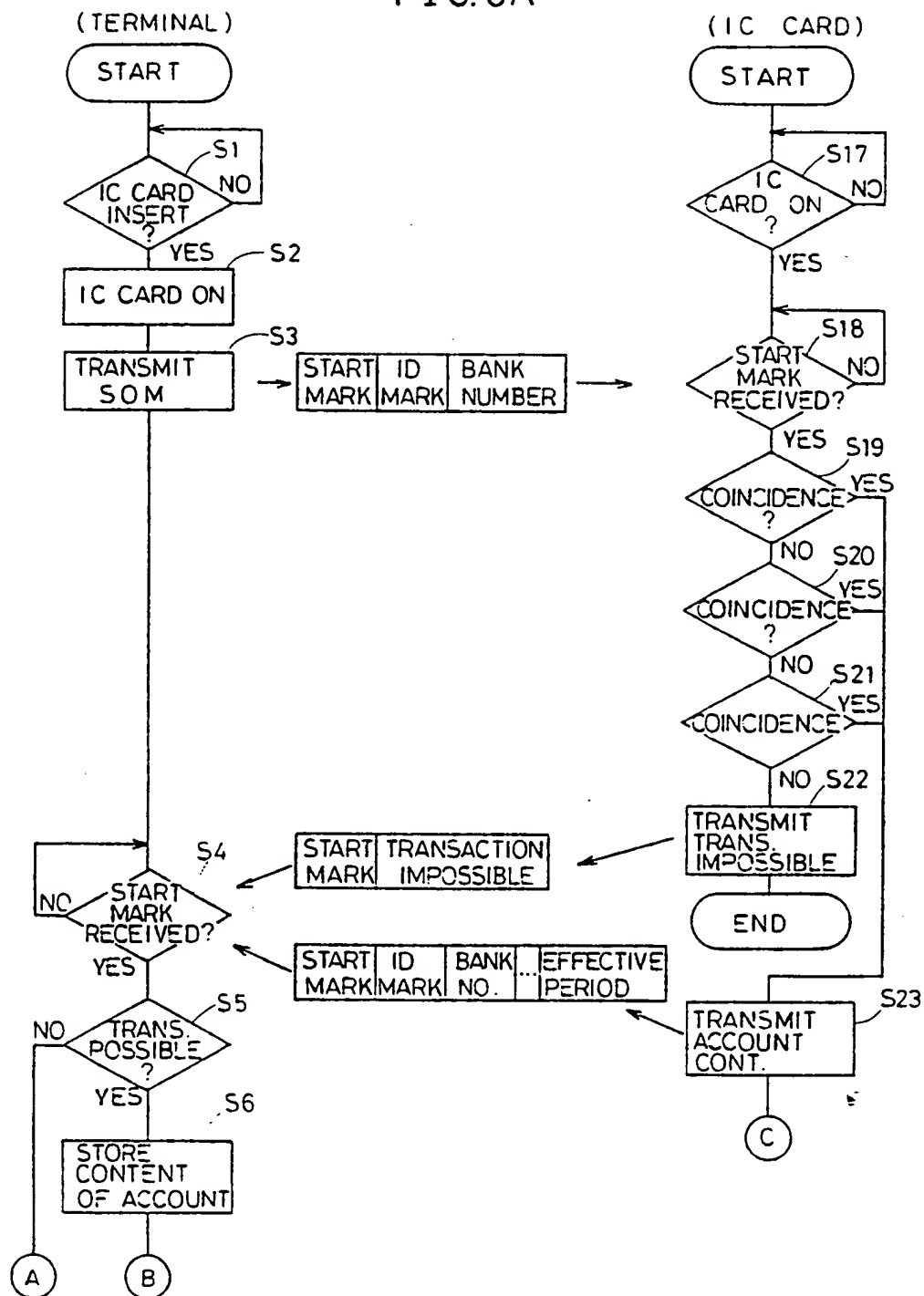




FIG. 8B

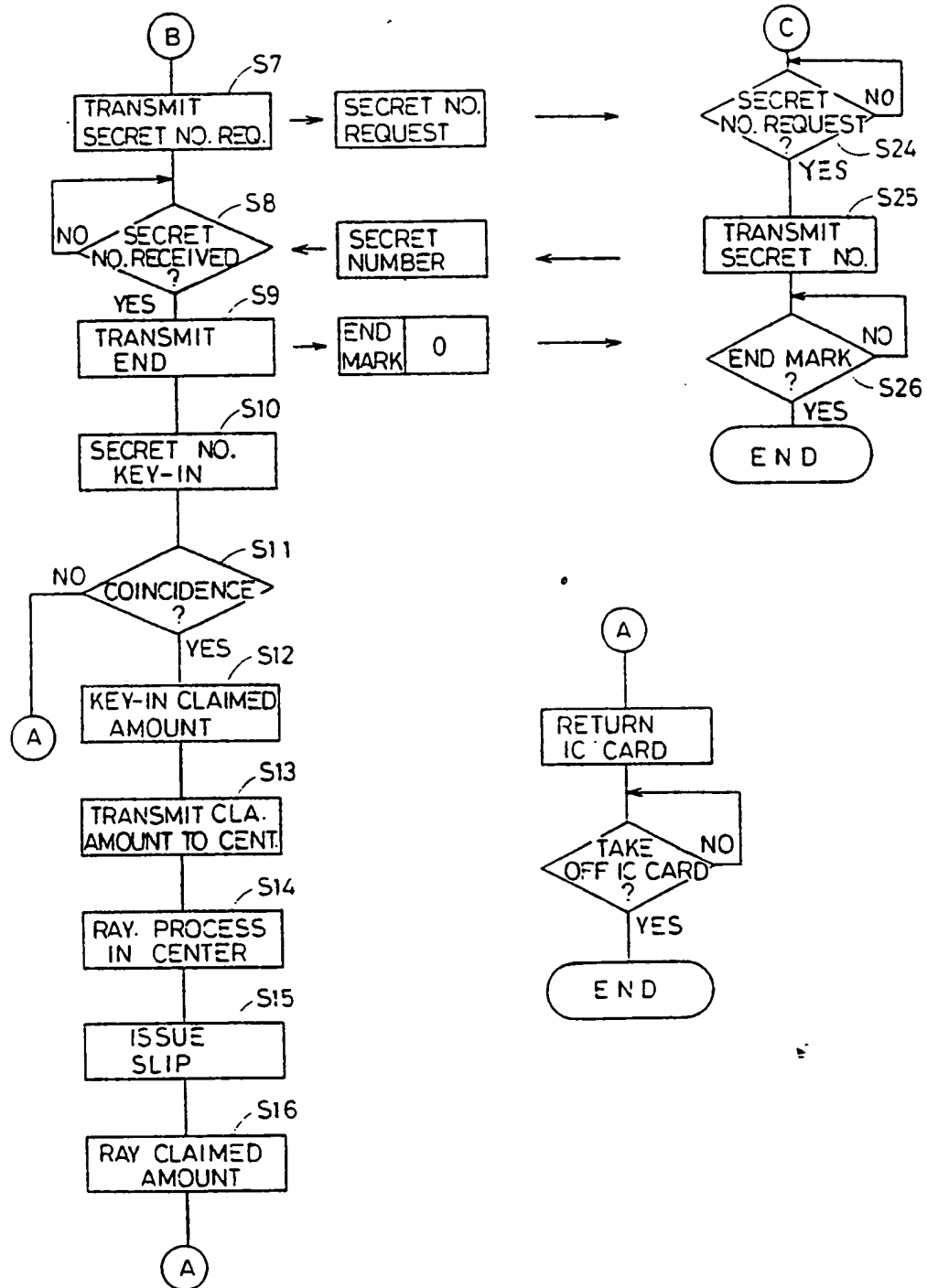


FIG. 9A

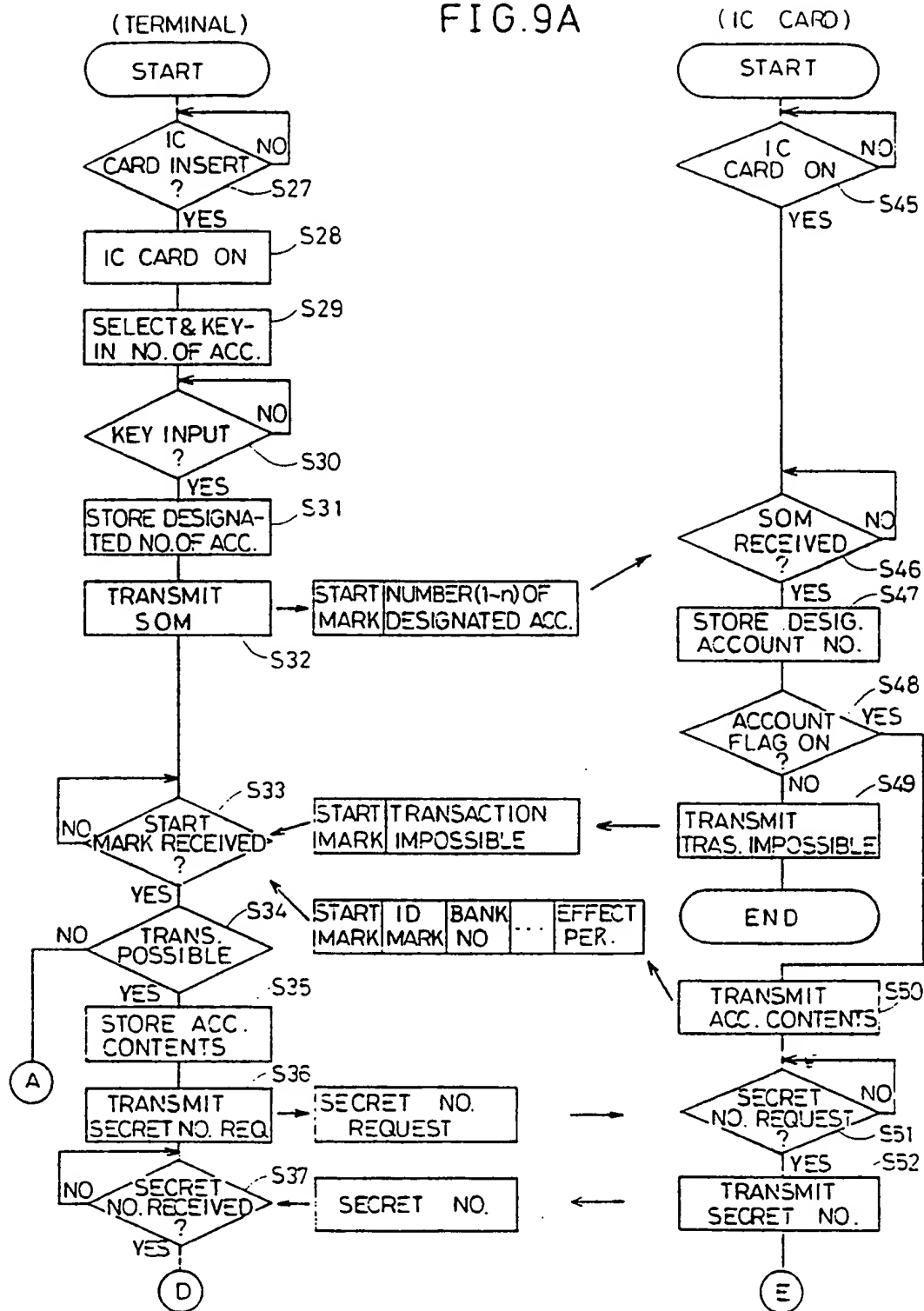


FIG. 9B

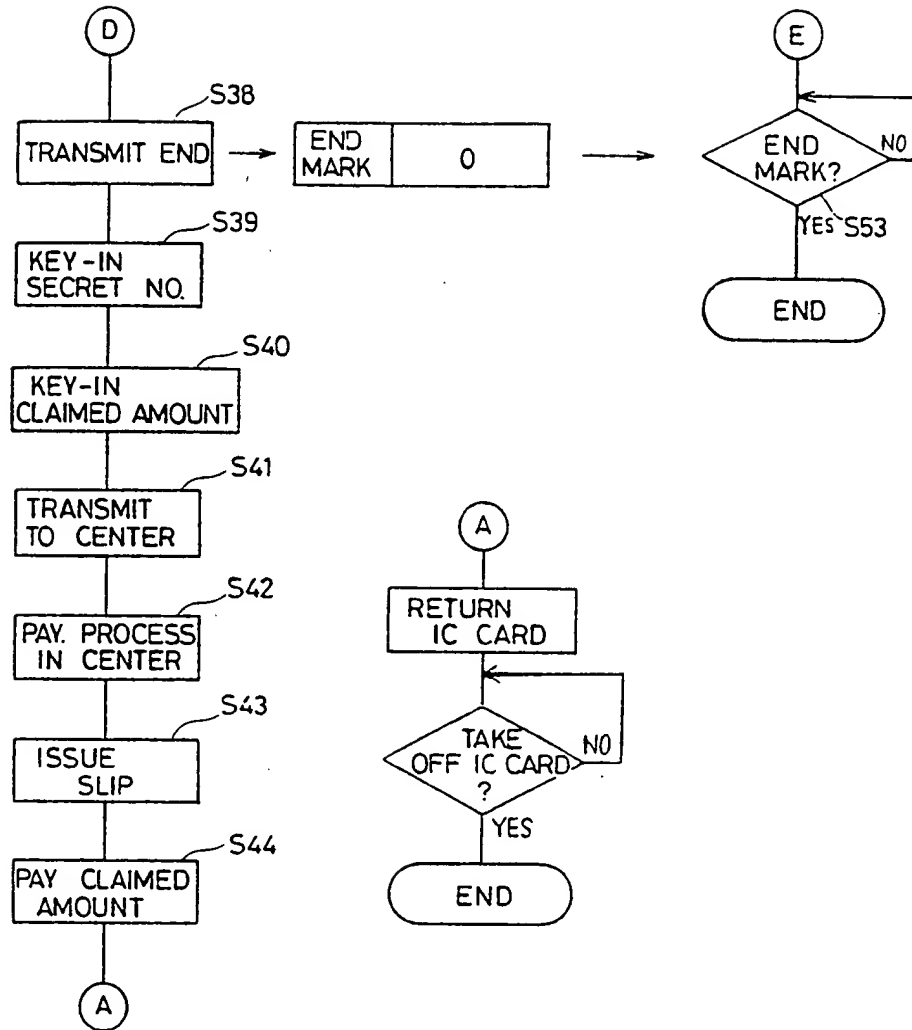


FIG.10A

FROM FIG. 9A

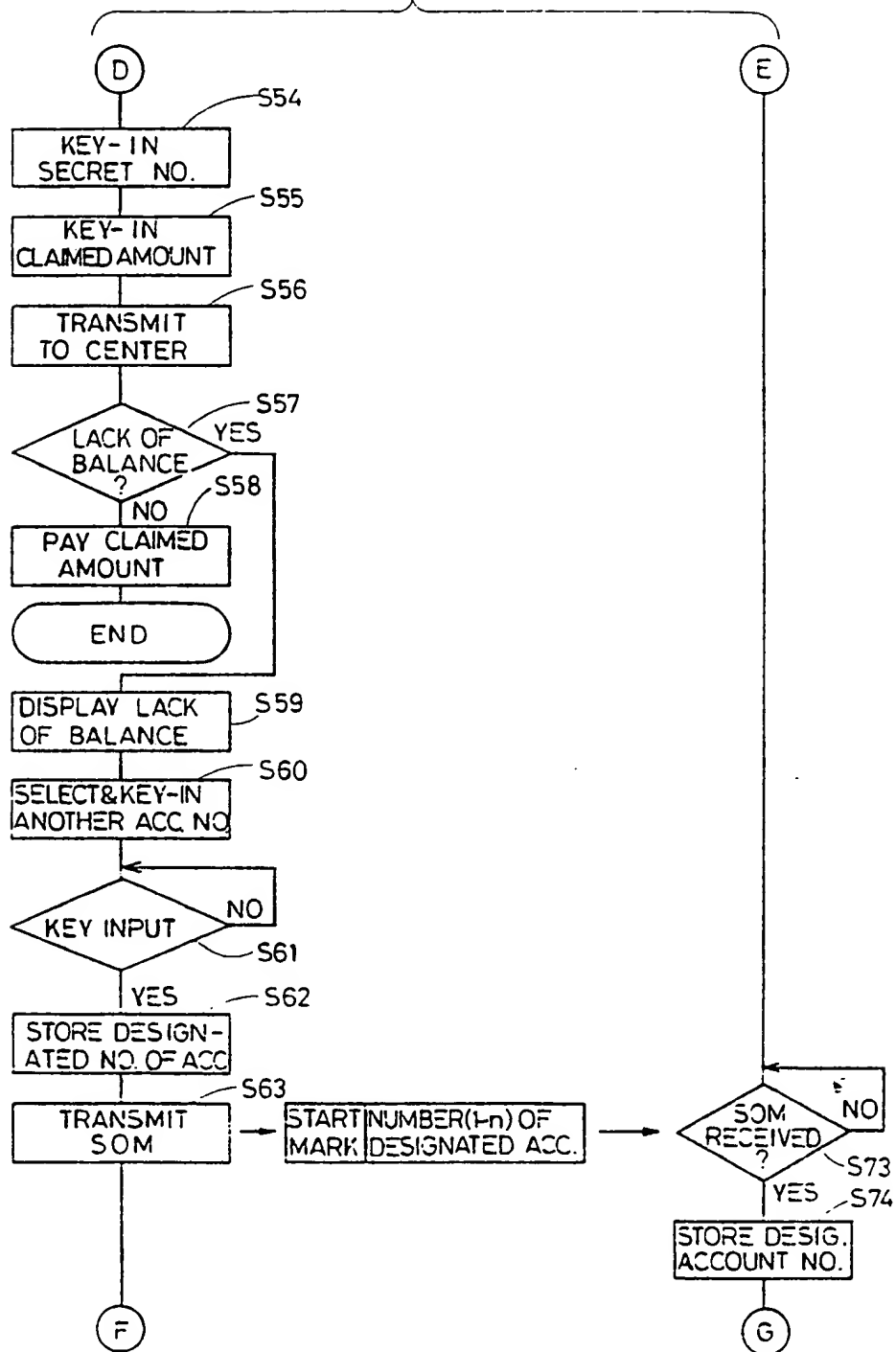


FIG.10 B

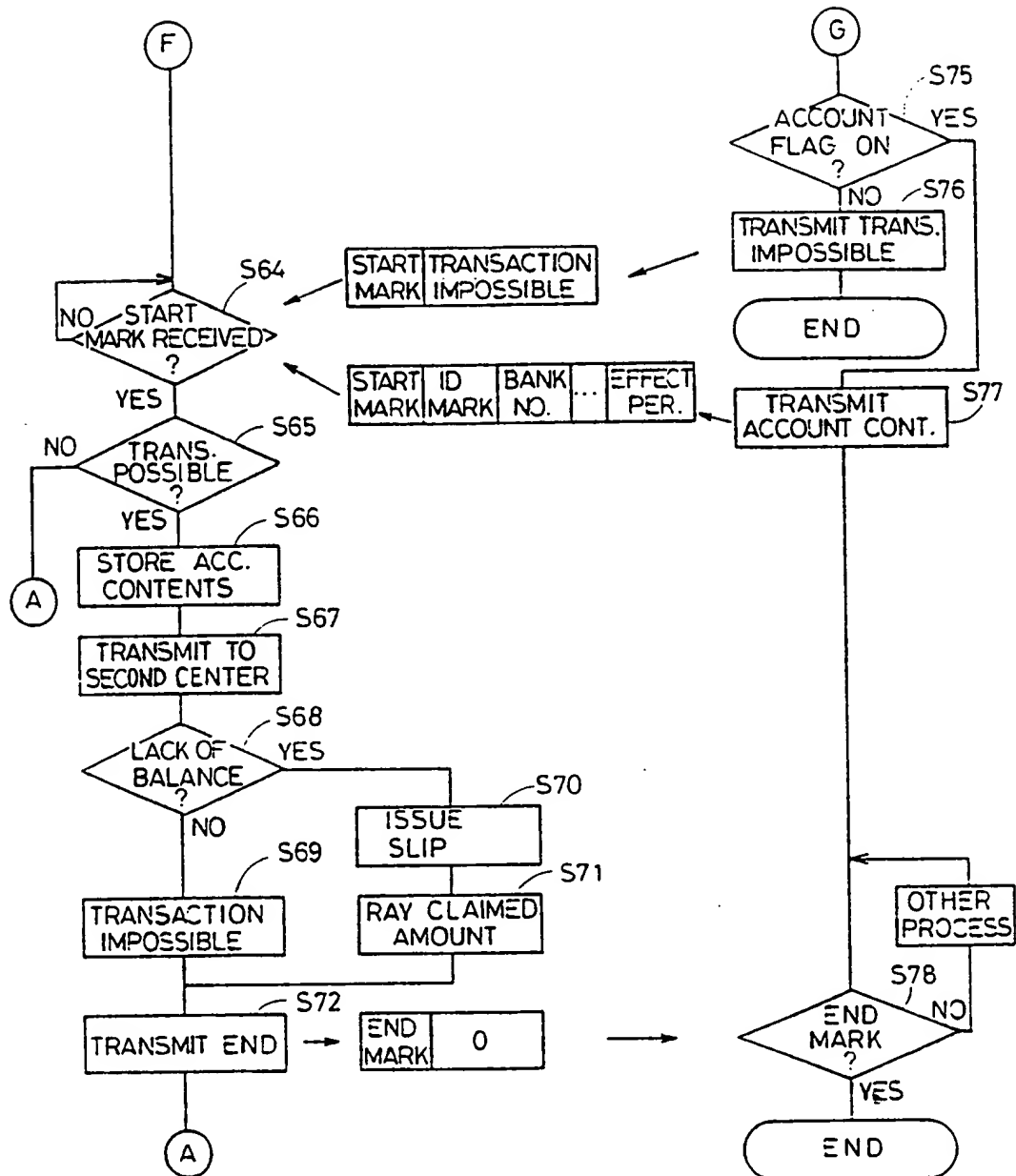


FIG. 11

FROM FIG. 9A

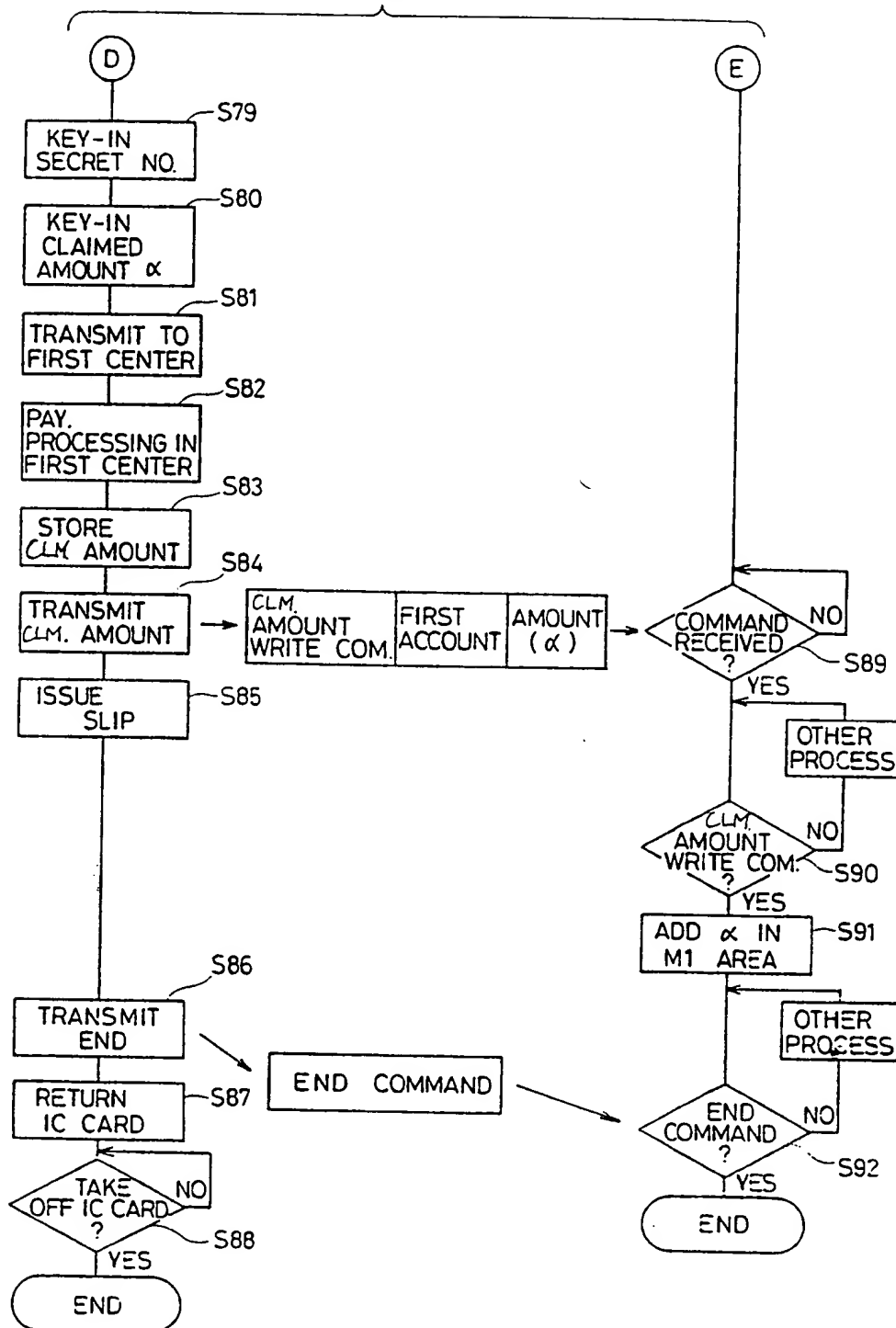
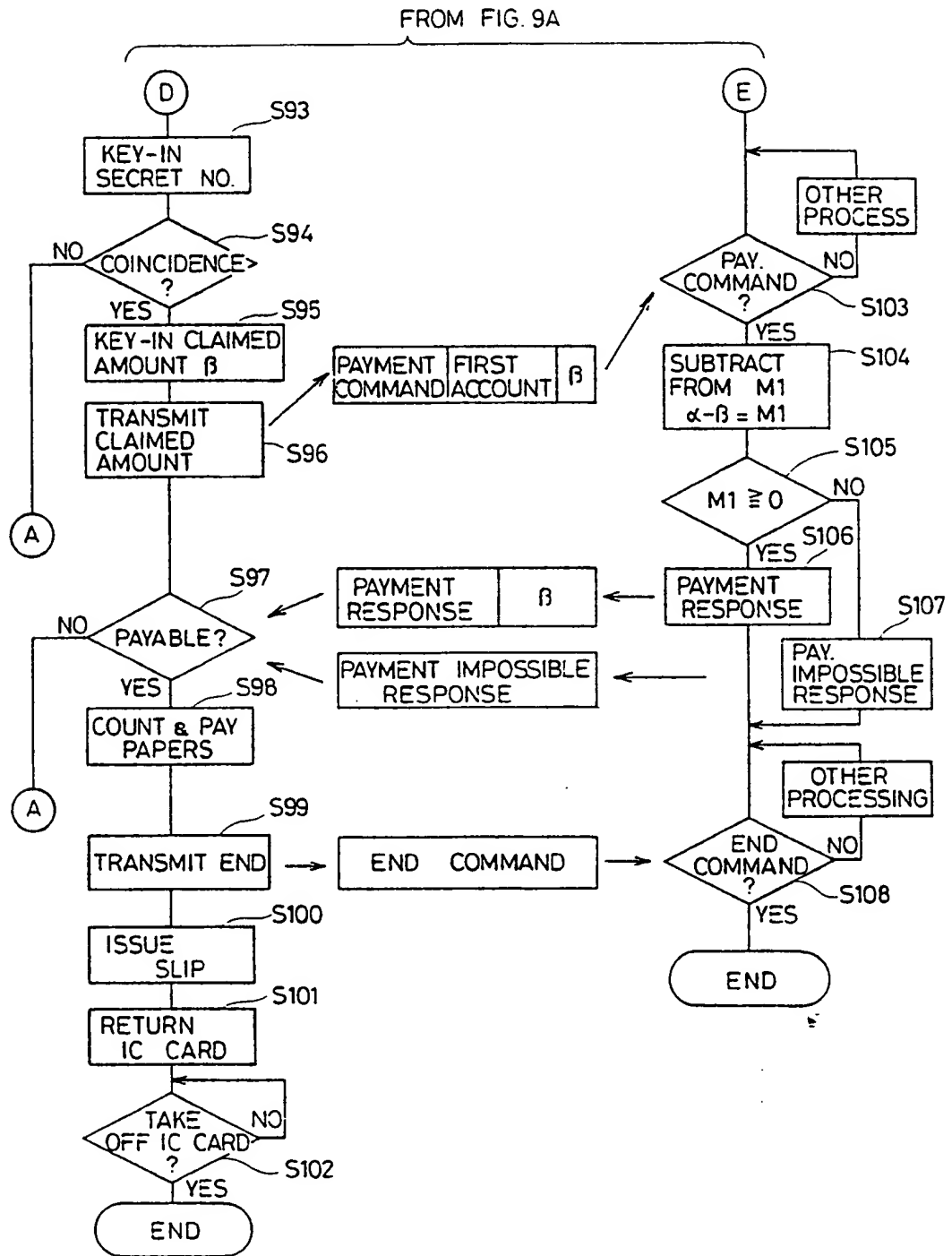


FIG. 12



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# EUROPEAN PATENT APPLICATION

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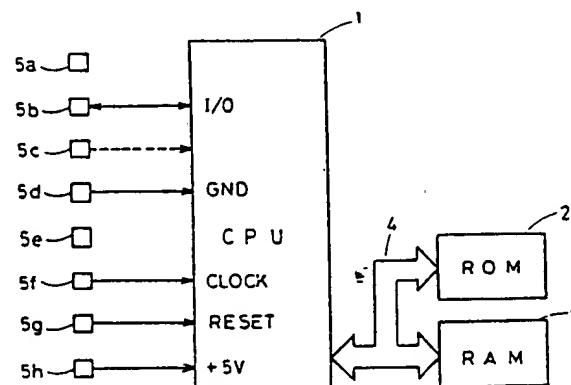
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54 **Financial transaction processing system using integrated circuit card.**

57 A financial transaction processing system comprising an IC card (6) for use in transaction with a financial body, terminals (21e-24e) communicating with the IC card (6) and centers (21-24) provided for each financial body. The IC card (6) comprises a read only memory (2) for storing data for specifying transaction accounts corresponding to a plurality of financial bodies and data of a single secret number common to the financial bodies. When the IC card (6) is inserted into the terminal, a customer can designate a specific account which he wishes to use, by operating a keyboard (20) provided in each of the terminals. In response to such designation, the corresponding account specifying data is read out from the ROM, but if the corresponding account is not stored in the ROM 2, a transaction can not be made. In addition, the account specifying data as read out and a claimed amount entered by a customer are sent to a center of each of the financial bodies where processing for payment is performed. However, if and when the balance is not sufficient, the center instructs the customer to select other account. A random access memory (3) included in the IC card (6) is made to store the amount after payment processing in the center, so that a transaction can be made with a cash dispensing terminal in an offline manner, by using such IC card (6).



**EP 0 157 416 A3**





European Patent  
Office

# EUROPEAN SEARCH REPORT

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Application Number

EP 85 10 4006

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	US-A-4 001 550 (SCHATZ) * Abstract; column 1, line 59 - column 2, line 9; column 2, line 43 - column 3, line 3; column 5, line 50 - column 8, line 11; claims 1,13 *	1-8	G 07 F 7/10
A	WO-A-8 303 694 (BENTON) * Abstract; page 13, line 26 - page 15, line 32 *	1-8	
P,A	US-A-4 443 027 (McNEELY et al.) * Abstract; column 2, lines 1-12; column 2, line 54 - column 3, line 15; claims 1,2 *	1-8	
A	EP-A-0 058 029 (HALPERN) * Abstract; claims 1-3,9 *	1	
A	US-A-3 376 661 (HULETT) * Abstract; column 1, line 21 - column 2, line 31 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			G 07 F G 06 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30-11-1987	Examiner GUIVOL, O.
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